

DANAE

‘Dynamics And predictability of the ENSO teleconnection in the North Atlantic-European region’

Referencia: CGL2015-68342-R

Modalidad: A

Investigador Principal: Pablo Ortega

Organismo/Centro: Barcelona Supercomputing Center – Centro Nacional de Supercomputación (BSC-CNS)

Subvención concedida (Costes directos): 121.000€ / TOTAL 146.410€

Fecha inicio: 01/01/2016

Fecha finalización: 31/12/2018

Contrato predoctoral asociado: Si Fecha inicio: 01/04/2017

Nombre: Bianca Mezzina (IT), BES-2016-076431

Presenta: **JAVIER GARCÍA SERRANO (RyC at UB), former-PI**



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PARTICIPANTES

Entidades participantes: BSC-CNS, UB (Spain), KNMI (The Netherlands), MPI (Germany), LMD (France), USP (Brazil)

Equipo de investigación: Pablo Ortega (BSC-CNS), Ileana Bladé (UB), Miguel Castrillo (BSC-CNS), Javier Vegas-Regidor (BSC-CNS)
[3M/1F]

Equipo de trabajo: Bianca Mezzina (*DANAE's PhD*), Froila Palmeiro (*DANAE's postdoc*), Larissa Batista (*DANAE's IT*), Reindert Haarsma (KNMI), Daniela Matei (MPI), Tércio Ambrizzi (USP), Álvaro de la Cámara and Marta Ábalos (LMD/NCAR->UCM)
[3M/5F]



MOTIVACIÓN, HIPÓTESIS Y ESTRATEGIA DEL PROYECTO

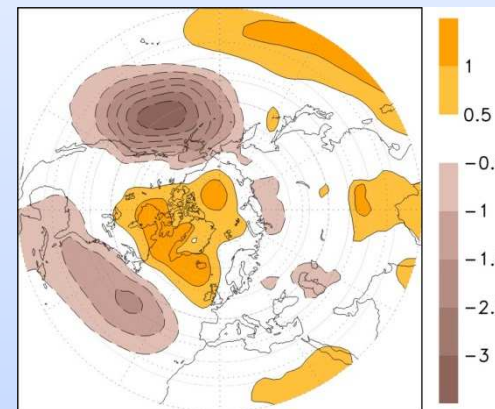
The winter climate variability in Europe still represents a hurdle to formulate skillful seasonal predictions (e.g. Doblas-Reyes et al. 2013).

DANAE explores the ENSO influence on the NAE region to increase current forecasting capabilities. It focuses on JFM (e.g. García-Serrano et al. 2011) and assesses the relative role of the tropospheric and stratospheric pathways.

The scientific objective of DANAE is to advance understanding of the simulation and prediction of the NAE surface climate:

- gaining insight into the dynamical mechanisms at work**
- assessing the ability of seasonal forecast systems in representing the ENSO-NAE teleconnection**
- exploring its link with model systematic errors (biases)**

**ENSO teleconnection in JFM
(SLP anomalies linked to Niño3.4)**



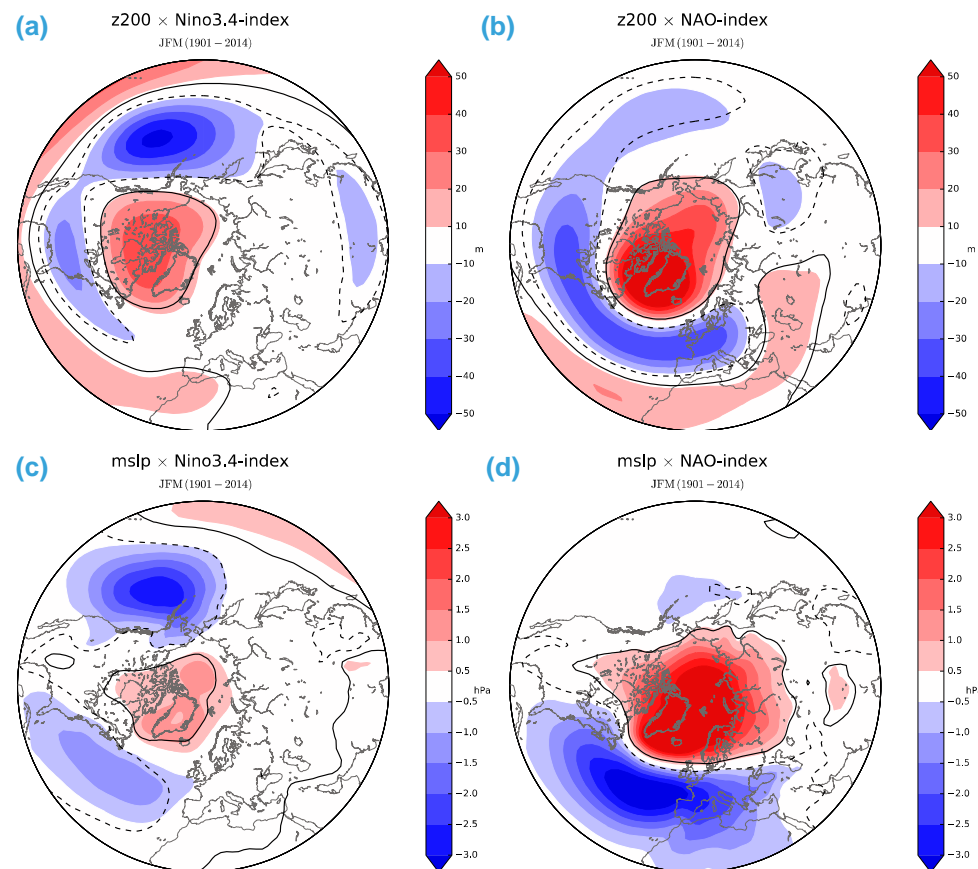
OBJETIVOS PROPUESTOS Y ALCANZADOS

1. **Objetivo 1: To describe the key variables and dominant processes underlying the ENSO-NAE teleconnection**
[90%; still pending some analysis on the stratospheric pathway]
2. **Objetivo 2: To assess the ability of current seasonal forecasts in capturing the ENSO-NAE teleconnection**
[60%; further analysis, including the stratosphere, in 2018]
3. **Objetivo 3: To quantify the contribution of ENSO to grid-point prediction skill over the NAE region**
[30%; intraseasonal analysis and regressing-out to be done in 2018]
4. **Objetivo 4: To explore the link between model systematic errors and the success/lack of prediction skill over the NAE region**
[0%; expected for the last 6 month of the project, Jul-Dec 2018]



RESULTADOS CIENTÍFICO-TÉCNICOS

Task 1.1: Revisit the ENSO-NAE teleconnection by using observations



Mezzina et al. [2018]



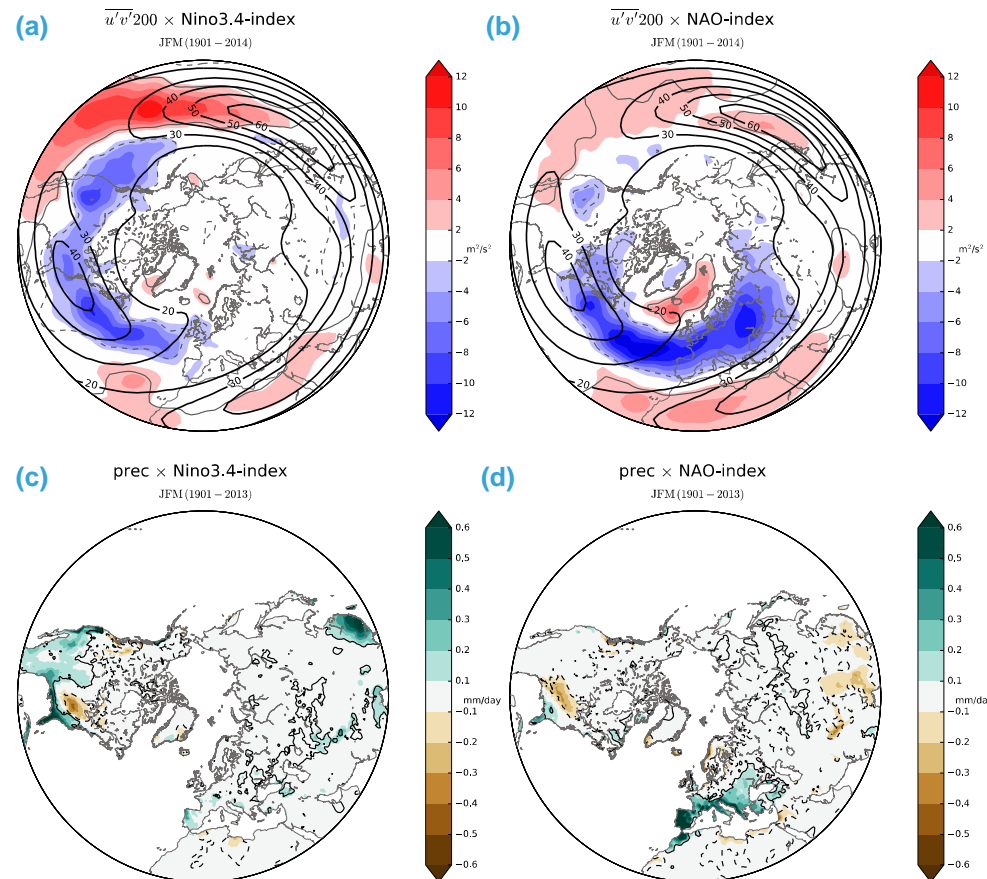
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RESULTADOS CIENTÍFICO-TÉCNICOS

Task 1.1: Revisit the ENSO-NAE teleconnection by using observations



Mezzina et al. [2018]



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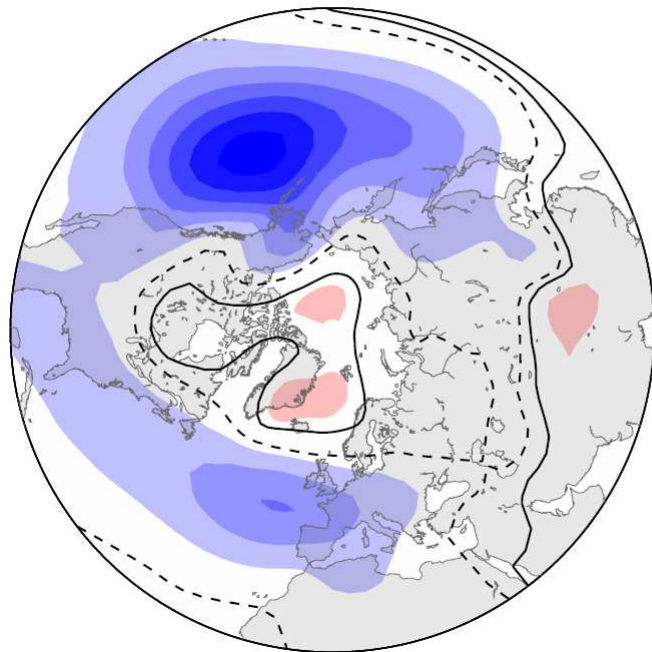
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RESULTADOS CIENTÍFICO-TÉCNICOS

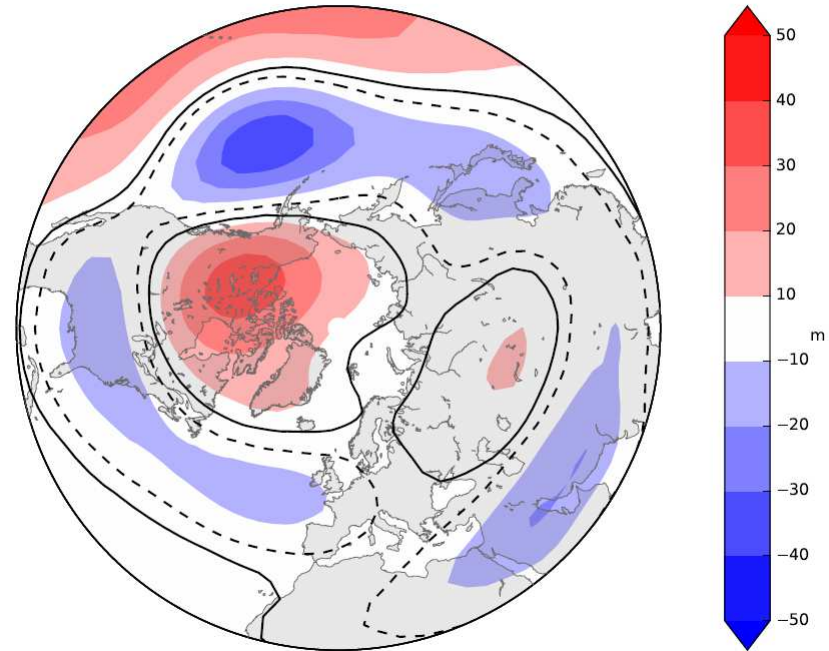
Task 1.2: Sensitivity experiments

10-member ensemble of AMIP (prescribing HadISST) 1900-2014 with SPEEDY

EOF1 mslp | NH | JFM (1901 - 2014)
exp.var.=44.9%



z200 x PC1 mslp NH | JFM (1901 - 2014)



Mezzina et al. [2018]



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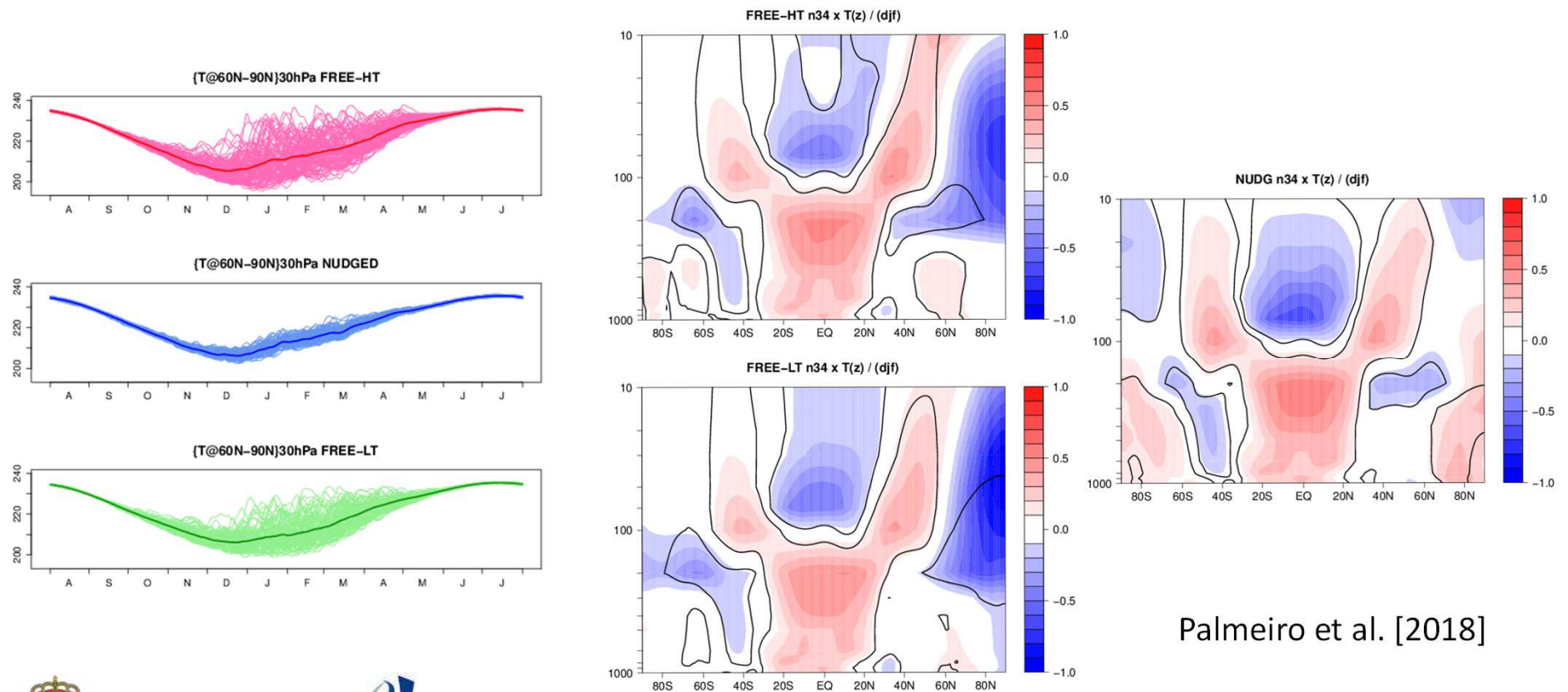


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RESULTADOS CIENTÍFICO-TÉCNICOS

Task 1.2: Sensitivity experiments

100 years, coupled simulation with high-top (HT 0.01hPa), low-top (LT 5hPa)
and high-top nudged to model climatology (NUDG) with EC-EARTH



Palmeiro et al. [2018]



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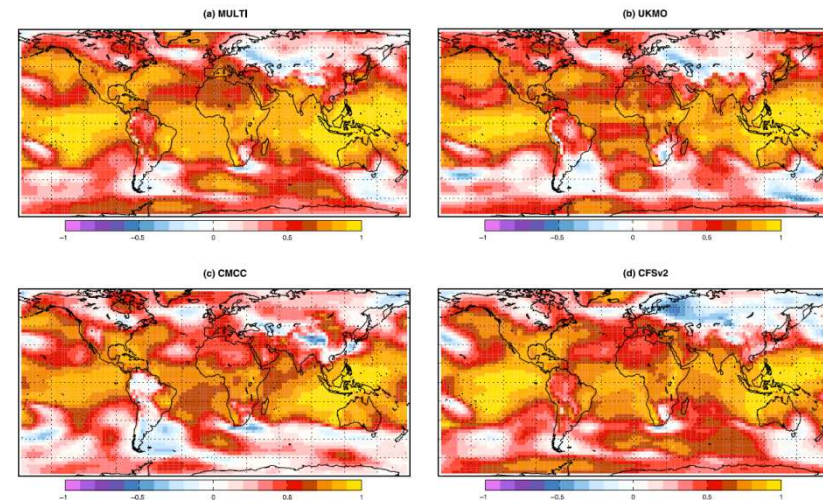
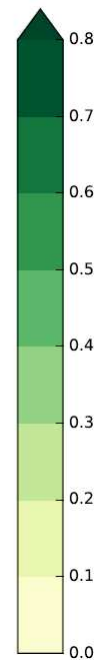
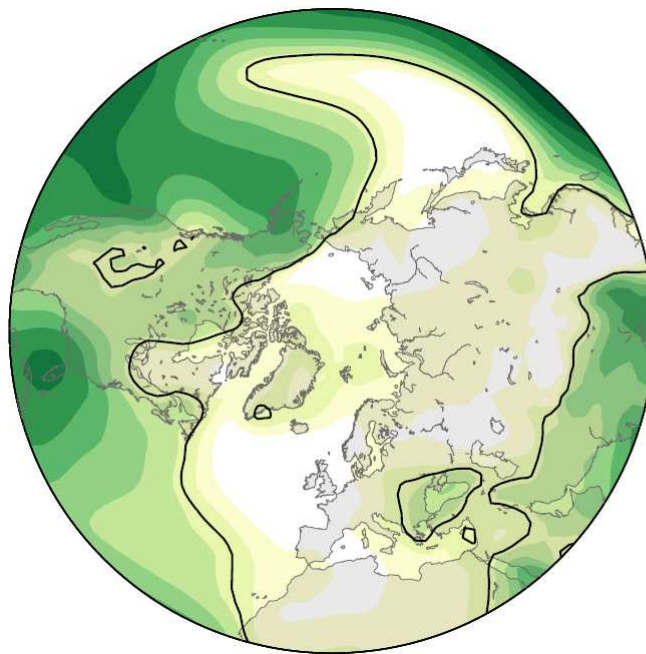


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RESULTADOS CIENTÍFICO-TÉCNICOS

Task 2: Prediction skill over the NAE region (Tasks 2.1,2.2,2.3)

SLP prediction skill (JFM)

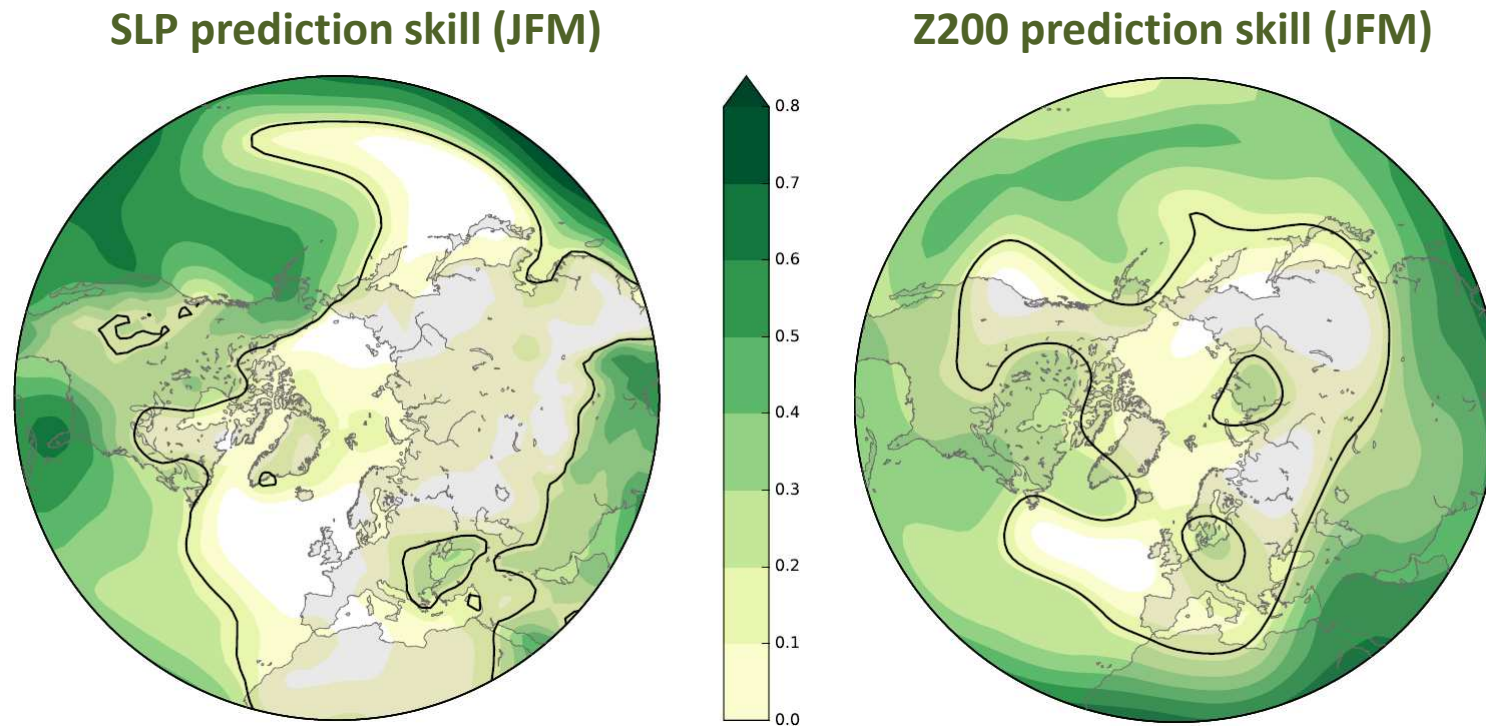


Athanasiadis et al. [2017, JCLIM]
multi-model skill assessment of SLP (DJF)



RESULTADOS CIENTÍFICO-TÉCNICOS

Task 2: Prediction skill over the NAE region (Tasks 2.1,2.2,2.3)



The prediction skill over the NAE region projects on the ENSO teleconnection



RESUMEN DE LOS RESULTADOS DEL PROYECTO

	Número	Indicios de calidad
J. García-Serrano , C. Cassou, H. Douville, A. Giannini, F. J. Doblas-Reyes (2017): Revisiting the ENSO teleconnection to the tropical North Atlantic. <i>Journal of Climate</i>	vol. 30, 6945-6957	(Q1) Impact Factor 4,3 [OpenAccess]
M.P. King, I. Herceg-Bulic, I. Bladé , J. García-Serrano , N. Keenlyside, F. Kucharski, C. Li, S. Sobolowski (2018): Importance of late-fall ENSO teleconnection in the Euro-Atlantic sector. <i>Bulletin of the American Meteorological Society</i>	vol. 99, 10.1175/BA MS-D-17- 0020.1	(Q1) Impact Factor 7,3 [OpenAccess]
N. Butchart, J.A. Anstey, K. Hamilton, S. Osprey, C. McLandress, A.C. Bushell, Y. Kawatani, Y.-H. Kim, F. Lott, J. Scinocca, T. Stockdale, C. Cagnazzo, C.-C. Chen, H.-Y. Chun, M. Dobrynin, R.R. Garcia, J. García-Serrano , L.J. Gray, L. Holt, T. Kerzenmacher, H. Naoe, H. Pohlmann, J. H. Richter, A.A. Scaife, F. Serva, S. Versick, S. Watanabe, K. Yoshida, S. Yukimoto (2018): Overview of experiment design and comparison of models participating in the SPARC Quasi-Biennial Oscillation initiative (QBOi). <i>Geoscientific Model Development</i>	vol. 11, 1009-1032	(Q1) Impact Factor 3,8 [OpenAccess]



RESUMEN DE LOS RESULTADOS DEL PROYECTO

	Referencia
B. Mezzina, J. García-Serrano, I. Bladé: Separating ENSO and NAO signatures in the North Atlantic. <i>European Geosciences Union (EGU) General Assembly 2018</i>	EGU2018-431 [poster]
R.J. Haarsma, J. García-Serrano, C. Prodhomme, O. Bellprat, P. Davini, S. Drijfhout: Impact of model resolution on the winter North Atlantic-European climate variability and predictability. <i>European Geosciences Union (EGU) General Assembly 2018</i>	EGU2018-2574 [poster]
I. Bladé, J. García-Serrano, B. Mezzina: Shedding light on the intraseasonal variations of the winter ENSO teleconnection in the Northern Hemisphere. <i>European Meteorological Society (EMS) Annual Meeting 2018</i>	EMS2018-843 [oral]
F.M. Palmeiro, J. García-Serrano, O. Bellprat, P.-A. Bretonnière, F.J. Doblas-Reyes: Sudden stratospheric warming variability in EC-EARTH. <i>European Meteorological Society (EMS) Annual Meeting 2018</i>	EMS2018-845 [poster]
...	



RESUMEN DE LOS RESULTADOS DEL PROYECTO

	Referencia
B. Mezzina, J. García-Serrano, F.M. Palmeiro, I. Bladé: Disentangling ENSO and NAO dynamics in the North Atlantic. <i>SPARC General Assembly 2018</i>	accepted [poster]
F.M. Palmeiro, J. García-Serrano, O. Bellprat, P.-A. Bretonnière, F.J. Doblas-Reyes: Assessing sudden stratospheric warming variability in the EC-EARTH climate model. <i>SPARC General Assembly 2018</i>	accepted [poster]
F.M. Palmeiro, J. García-Serrano, M. Ábalos: Dynamics of the ENSO impact on the tropical upwelling. <i>SPARC General Assembly 2018</i>	accepted [poster]



FORMACIÓN DE PERSONAL

Tesis doctorales realizadas relacionadas con el proyecto (con indicación de título, fecha de inicio y de lectura, e indicadores relativos a publicaciones derivadas)

Bianca Mezzina (PhD in progress): 1 manuscript in preparation; 3 poster contributions [EGU 2018, SPARC General Assembly 2018]

Actividades de formación de predoctorales y/o personal técnico relacionadas con el proyecto (destacar / agregar)

B. Mezzina: ICTP/ECMWF/U.L'Aquila workshop on OpenIFS (Trieste, Italy, 5-9 Jun 2017)

B. Mezzina: IUGG/SPARC/EGU stratosphere-troposphere interactions training school (Cape Town, South Africa, 2-5 Sep 2017)

B. Mezzina: GOTHAM international summer school (Potsdam, Germany, 18-22 Sep 2017)

Contrato Predoctoral asociado al proyecto

Bianca Mezzina (IT) - BES-2016-076431, started on 01/04/2017



INTERNACIONALIZACIÓN DE LA INVESTIGACIÓN

DANAE has expanded the collaboration as in-kind contribution to two Belmont Forum/JPI-Climate projects: *'The potential of seasonal-to-decadal-scale inter-regional linkages to advance climate predictions - InterDec'* (PI D. Matei, MPI-M, Germany [member of the Work Team in DANAE]), and *'Globally observed teleconnections and their role and representation in hierarchies of atmospheric models - GOTHAM'* (PIs L. Gray/S. Osprey, U. Oxford, UK). With the latter, DANAE is also contributing to QBOi (*Towards improving the Quasi-Biennial Oscillation in global climate models*), an initiative of SPARC/WCRP.

DANAE has also allowed to enlarge the funding for the investigation of ENSO and its teleconnection in the Euro-Atlantic sector, thanks to a JPI-Climate/ERA4CS project, with co-funding applicability: *'Mediterranean services chain based on climate predictions - MEDSCOPE'* [GA 690462; total budget 14.796.910€ / BSC-CNS budget 1.173.750€; 2018-2020]. J. García-Serrano is task leader of T2.2 'Teleconnections with low-latitudes'



Otros aspectos destacables relacionados con el proyecto

During the duration of the project, J. García-Serrano has been convening a session in the European Meteorological Society (EMS) annual meetings:

**2016 – ASI6/UC8 ‘Towards better understanding mid-latitude atmospheric teleconnections’
[Trieste, Italy; 14 contributions]**

**2017 – UP3.2 ‘Mid-latitude atmospheric teleconnections’
[Dublin, Ireland; 22 contributions]**

**2018 – UP3.2 ‘Mid-latitude atmospheric teleconnection dynamics’
[Budapest, Hungary; 18 contributions]**



EJECUCION DEL PRESUPUESTO

Concepto	Ejecutado: Cantidad y (%)	Existen cambios relevantes respecto a solicitud original? (*)
Inventariable	973 € (100%)	NO
Personal	53.000 € (60%)	SI
Otros gastos (fungible+pub)	372€ (5%)	NO
Viajes y dietas	11.200 € (90%)	NO

(*) Gastos no contemplados en la solicitud original

To accomplish setting-up and performing the sensitivity experiments carried out with EC-EARTH (Task 1.2), i.e. high-top and low-top configurations and stratospheric nudging, a Support Engineer has been hired: Larissa Batista (BR)



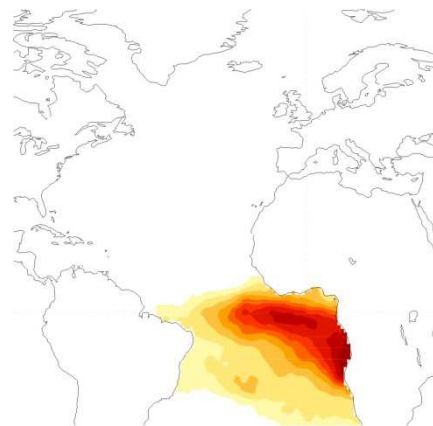
PLANTEAMIENTO FUTURO

..continuing with the research line on Teleconnection Dynamics for Climate Prediction (RyC):

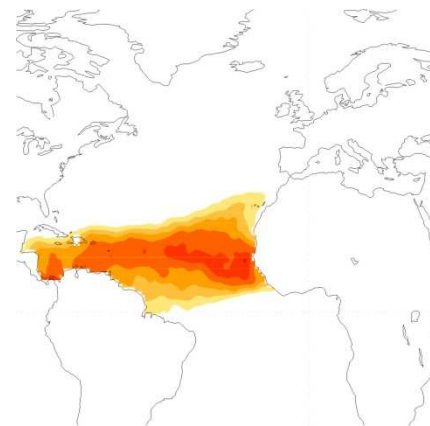
ATLANTE

Dynamics and predictability of the tropical **ATLANTic** teleconnections to the Euro-Atlantic sector

Proyecto I+D+i RETOS 2018



Atlantic Niño



Subtropical North Atlantic



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